Having described the preferred embodiments, the invention is now claimed to be:

1. A nuclear camera (10) including:

a rotatable gantry (12, 12', 12'', 12''') defining a gantry rotation axis (66) and an imaging isocenter (22, 22', 22'', 22'''); and

a gamma detector (20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$) arranged on the rotating gantry (12, 12', 12'', 12''') at a fixed radial distance (R, $R_2$, $R_3$, $R_5$) from the imaging isocenter (22, 22', 22'', 22'''), the gamma detector including a radiation-sensitive surface (72) and a collimator (70) that collimates incoming radiation.

2. The nuclear camera (10) as set forth in claim 1, wherein the collimator (70) includes:

a plurality of spaced-apart slats (74) arranged transverse to the radiation-sensitive surface (72), each adjacent slat pair ($74_1$, $74_2$) defining a viewing plane.

3. The nuclear camera (10) as set forth in claim 2, wherein the gamma detector (20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$) further includes:

a means (86) for spinning the collimator slats (74) and the radiation sensitive surface 72 about a slat rotation axis (88) that is generally orthogonal to the gantry rotation axis (66).

4. The nuclear camera (10) as set forth in claim 3, wherein:

the slats (74) have a spacing and height selected based on a selected spatial imaging resolution, a predetermined imaging time, and the fixed radial distance (R, $R_2$, $R_3$, $R_5$); and

a width ($C_y$) of each generally linear detector (82) is selected based on a selected detector sensitivity, the predetermined imaging time, the fixed radial distance (R, $R_2$, $R_3$, $R_5$), and the slat pair ($74_1$, $74_2$).

5. The nuclear camera (10) as set forth in claim 4, wherein the slat height in a direction transverse to the radiation-sensitive surface (72) corresponds to a ratio of the fixed radial distance (R, $R_2$, $R_3$, $R_5$) and the selected spatial imaging resolution.

6. The nuclear camera (10) as set forth in claim 3, wherein the radiation-sensitive surface (72) includes an array of solid state detector elements.

7. The nuclear camera (10) as set forth in claim 6, further including:

a radiation source (96) disposed on the rotatable gantry (12''') and producing transmission radiation; and

an transmission radiation detector (98) mounted opposite the radiation source (96) that detects the transmission radiation.

8. The nuclear camera (10) as set forth in claim 1, further including at least four gamma detectors (20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$) mounted at the fixed radial distance (R, $R_2$, $R_3$, $R_5$) from the imaging isocenter (22, 22', 22'', 22''').

9. The nuclear camera (10) as set forth in claim 8, further including:

at least a pair of radiation detectors (94) oppositely mounted on the rotatable gantry that are configured to perform coincidence detection of radiation emitted during positron-electron annihilation.

10. The nuclear camera (10) as set forth in claim 8, wherein the:

the gamma detectors (20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$) are collimated for at least two different imaging resolutions.

11. The nuclear camera (10) as set forth in claim 1, further including:

a generally toroidal housing (14) substantially enclosing the rotatable gantry (12, 12', 12'') and the gamma detector (20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$).

12. The nuclear camera (10) as set forth in claim 11, further including:

a second generally toroidal housing (54) holding a second imaging modality, the second generally toroidal housing (54) being mounted a fixed distance from the first generally toroidal housing (14).

13. A nuclear camera (10) including:

at least four SPECT radiation detectors (20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$) rotatably arranged around an imaging region to receive emission radiation, the radiation detectors each disposed an equal distance (R, $R_2$, $R_3$, $R_5$) from an imaging isocenter (22, 22', 22'', 22'''), the radiation detectors each including a radiation-sensitive surface (72) that responds to the first emission radiation;

a slat collimator (70) disposed on each radiation detector between the radiation detector and the imaging region to provide planar collimation of incoming first emission radiation; and

a means (86) for spinning the collimator (70) and radiation-sensitive surface (72) of each SPECT radiation detector about a detector axis (88).

14. The nuclear camera (10) as set forth in claim 13, further including:

a generally circular rotatable gantry (12, 12', 12'', 12''') on which the radiation detectors (20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$) are disposed; and

an optically opaque housing (14) that is substantially transmissive for the first emission radiation.

15. The nuclear camera (10) as set forth in claim 13, further including radiation detectors configured for at least one of a different SPECT resolution and a different imaging modality.

16. The nuclear camera (10) as set forth in claim 13, further including:

a computed tomography scanner including a transmission radiation source (96) and a transmission radiation detector (98) disposed opposite the transmission radiation source (96) on the rotatable gantry (12''').

17. A radiological imaging method including:

circularly orbiting at least one radiation detector (20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$) about an imaging volume at a fixed radial distance (R, $R_2$, $R_3$, $R_5$) from a first axis of rotation (66) through the imaging volume; and

detecting radiation from the imaging volume at a generally planar radiation-sensitive region (72) of the radiation detector, the radiation-sensitive region facing the imaging volume during the fixed radius circular orbiting.

**18.** The radiological imaging method as set forth in claim **17**, further including:

during the circular orbiting, spinning a slat collimator **(70)** and a radiation-sensitive array **(72)** about an axis **(88)** perpendicular to the first axis of rotation **(66)**;

integrating radiation detected over generally planar regions **(80)** defined by the slat collimator **(70)** to generate plane integral projection views; and

reconstructing an image representation of the imaging volume from the plane integral projection views.

**19.** The radiological imaging method as set forth in claim **18**, wherein the orbiting rotates each of a plurality of detectors **($20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$)** to common locations M times, where M is an integer, and the collimator **(70)** and radiation-sensitive array **(72)** are spun one of 180 ° /M and 360°/M at each location..

**20.** The radiological imaging method as set forth in claim **18**, further including:

selecting a minimum width **($C_y$)** of the generally planar radiation-sensitive array **(72)** in a direction parallel to the generally planar regions **(80)** to provide a selected radiation detection sensitivity.

**21.** The radiological imaging method as set forth in claim **17**, wherein the orbiting includes:

orbiting a plurality of radiation detectors **($20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$)** over an angle of 180° divided by the number of radiation detectors.

**22.** The radiological imaging method as set forth in claim **21**, further including:

selecting at least one of collimator slat spacing **(G)** and collimator height **($W_z$)** in accordance with a selected resolution and the fixed radial distance **(R, $R_2$, $R_3$, $R_5$)**.

**23.** The radiological imaging method as set forth in claim **17**, further including:

disposing a radiation-transmissive, optically opaque shield **(14)** between the at least one radiation detector **(20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$)** and the imaging volume, the shield **(14)** remaining stationary during the circular orbiting and blocking optical communication between the imaging volume and the radiation detector during the circular orbiting.

**24.** The radiological imaging method as set forth in claim **17**, further including:

orbiting at least four radiation detectors **(20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$)** at the fixed radial distance **(R, $R_2$, $R_3$, $R_5$)**.

**25.** The radiological imaging method as set forth in claim **24**, wherein the detectors **(20, 20', 20'', $20_1$, $20_2$, $20_3$, $20_4$, $20_5$, $20_6$)** include SPECT detectors collimated for a first resolution and at least one of:

a SPECT detector collimated for a second resolution,

a pair of PET detectors, and

a transmission radiation detector.